

REMARKS

Claims 38-45, 55-61, and 66-68 were previously pending in this application. Claims 1-4 were rejoined by the Examiner. Claims 1-4, 38, 44, and 55 have been amended. Independent claims 1, 38, and 55 have been amended to recite, in part, an activated carbon-metal oxide matrix having a hydrogen sulfide breakthrough capacity of 0.26 gH₂S/ccC, and is supported in the specification as filed, for example, at page 9, lines 9-10. Dependent claims 2-4 have been amended to conform to amended claim 1. Dependent claim 44 has been amended by removing the phrase "that does not condense on the matrix." New claims 69 -71 have been added. As a result claims 1-4, 38-45, 55-61, and 66-72 are pending for examination with claims 1, 38, and 55, 69, and 70 being independent claims. No new matter has been added.

A declaration of James R. Graham, Ph.D. (hereinafter Graham Affidavit) is attached.

Applicants respectfully request that this amendment be entered after final, as claim 1 was not previously pending examination.

Rejections Under 35 U.S.C. §103

Claims 1-4, 38-45, 55-61, and 66-68 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP 7-313,867 (JP '867). This rejection is respectfully traversed.

JP'867 fails to disclose, teach, or suggest an activated carbon-metal oxide matrix comprising a metal oxide uniformly dispersed within the activated carbon, wherein the activated carbon-metal oxide matrix has a hydrogen sulfide breakthrough capacity of at least about 0.26 gH₂S/ccC, or its corresponding methods of use, as recited in independent claims 1, 38, and 55, respectively. JP '867 discloses a method of preparing a deodorant comprising mixing an activated carbon, a metal oxide, methyl cellulose, and a clayey substance. The resultant mixture is kneaded and extruded. (JP '867 translation, paragraph 0009.) The JP '867 process results in a deodorant wherein the metal oxide is deposited on the surface of the activated carbon within the pore structure. (See Graham Affidavit, paragraph 12.)

One skilled in the art would not have looked to JP '867 to arrive at the activated carbon-metal oxide matrix as recited in each of the independent claims 1, 38, and 55, because JP '867 uses a metal oxide to increase extraction of ammonia but does not show an increase in hydrogen sulfide extraction by the addition of the metal oxide to the activated carbon. Embodiment 1 of JP

'867, including a metal oxide, mixed with an activated carbon, methyl cellulose, and a clayey substance, and Comparative Example 1, without a metal oxide, both resulted in identical hydrogen sulfide extraction ratios. (JP '867, Tables 1 and 3.) JP '867 explicitly states that the deodorant disclosed relies on the inherent hydrogen absorption capability of active carbon. (JP '867 translation, paragraph 0020.) In fact, the hydrogen sulfide breakthrough capacity of the Embodiment 1 of JP '867 is only 0.07 gH₂S/ccC. (See Graham Affidavit, paragraph 9.)

Because JP '867 teaches no improvement in hydrogen sulfide extraction when a metal oxide is mixed with an activated carbon, it would not have been obvious to one skilled in the art to form an activated carbon-metal oxide matrix having a hydrogen sulfide capacity of at least about 0.26 gH₂S/ccC.

Moreover, because many factors contribute to the absorption capacity of deodorizing material, it would not have been obvious to one skilled in the art to modify JP '867 to arrive at the activated carbon-metal oxide matrix as recited in each of independent claims 1, 38, and 55. As noted in JP '867, "physical absorption of malodorous molecules in the micropores of the carbon is the dominant factor in the deodorizing operation of active carbon." (JP '867 paragraph 0003). However, as noted in the Graham Affidavit, paragraph 3, porosities of activated carbons are dependent not only on the starting materials, but also on the activation methods and processes. The butane number of Embodiment 1 indicating pore volume of JP '867 is only 14.1%, and the hydrogen sulfide breakthrough capacity of Embodiment 1 is only 0.07 gH₂S/ccC. (See Graham Affidavit, paragraph 9.) In contrast, the structure of the activated carbon-metal oxide matrix of the present invention provides a surprisingly high hydrogen sulfide breakthrough capacity of at least about 0.26 gH₂S/ccC and is advantageous because the highly dispersed metal oxide does not occupy (and reduce) the overall pore volume of the activated carbon. (Present application, page 6, lines 4-9.) This structural improvement is not clearly disclosed or suggested in JP '867. As such, independent claims 1, 38, and 55 are patentable over this reference. Claims 2-4, 39-45, 54-61, and 66-68 depend directly or indirectly from 1, 38, and 55 respectively, and are patentable over this reference for at least the above-mentioned reasons. Accordingly, withdrawal of this rejection is respectfully requested.


New claim 71 is directed to an activated carbon-metal oxide matrix, wherein the metal oxide is uniformly dispersed within the matrix and the matrix has a pore volume substantially free of the metal oxide. New claim 72 is directed to an activated carbon-metal oxide matrix

formed in part by combining a ground peroxidized carbon with a metal oxide and a binder to form a mixture, extruding the mixture to form an extrudate, carbonizing the extrudate to form a carbonaceous mixture, and activating the carbonaceous mixture to form an activated carbon-metal oxide matrix, wherein the metal oxide is uniformly dispersed within the matrix. As noted above, JP '867 discloses a deodorant wherein the metal oxide is deposited on the surface of the activated carbon. Also as noted above, JP '867 discloses forming the deodorant material by mixing a pre-activated carbon with a metal oxide. As such, claims 71 and 72 are patentable over this reference.

CONCLUSION

In view of the foregoing Amendments and Remarks, this application is now in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this Amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below. If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/2762.

Respectfully submitted,
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